

What is claimed is:

1. A method of assembling a diagnostic medical test kit, the method comprising:
 - a) providing an automatic assembly system including an assembly line and a parallel return line, the assembly line and the return line including conveyors running in opposite directions and a start end and a return end, a plurality of pallets carrying the components of the medical test kit during assembly, a plurality of work stations disposed along the assembly line to perform assembly steps on the components of the medical test kit, a start end pallet transfer mechanism disposed at the start end of the assembly line and the return line to transfer the pallets from the return line to the assembly line, and a finish end pallet transfer mechanism disposed at the finish end of the assembly line and the return line to transfer the pallets from the assembly line to the return line;
 - b) providing a plurality of empty pallets on the conveyor of the return line;
 - c) moving the empty pallets on the conveyor of the return line to the start end of the return line;
 - d) transferring the empty pallets from the start end of the return line to the start end of the assembly line with the start end pallet transfer mechanism;
 - e) moving the pallets on the conveyor of the assembly line to the plurality of work stations and using the pallets as carriers for a partially completed and completed diagnostic medical test kit;
 - f) assembling the components of the diagnostic medical test kit at the plurality of work stations;

- g) transferring completed diagnostic medical test kits from the pallets, producing empty pallets;
- h) transferring faulty diagnostic medical test kits from the pallets, producing empty pallets;
- 5 i) moving the empty pallets on the convey of the assembly line to the finish end of the assembly line;
- j) transferring the empty pallets from the finish end of the assembly line to the start end of the return line;
- k) repeating steps c-j above.

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2. The method of claim 1, wherein steps c-k are automatically performed.

15 3. The method of claim 1, further including performing a product changeover by replacing one or more of the work stations along the assembly line with one or more different work stations along the assembly line and replacing the plurality of pallets with a plurality of different pallets.

20 4. The method of claim 1, wherein the above method is performed in a one-up configuration, where one assembly operation occurs per machine cycle.

5. The method of claim 1, wherein at least 3,600 cycles are performed per hour with at least one part produced per cycle.

6. The method of claim 1, wherein the conveyor of the assembly line is an indexing conveyor that is servo-driven and synchronous-intermittent.

7. The method of claim 1, wherein the conveyor of the assembly line includes an upper surface with a plurality of cleats, and the pallets include respective recesses that receive the cleats of the conveyor.

8. The method of claim 1, wherein the conveyor of the return line is a variable-speed linear return accumulating conveyor.

10 9. The method of claim 1, wherein the diagnostic medical test kit includes a base, a test strip, a wick, a cover, and a cap, the plurality of work stations include a base loading station, a test strip insertion station, a wick loading station, a cover load work station, a pneumatic press station, a cap load and assembly station, an assembly verification work station, an eject defective product work station, and an eject good product work station, and assembling the components of the diagnostic medical test kit at the plurality of work stations includes loading the base into the pallet with the base loading station, indexing, cutting, and placing a single test strip into the base with the test strip insertion station, placing the wick in the base with the wick loading station,

15 20 providing a cover on the base with the cover load work station, snapping the cover to the base with the pneumatic press station, providing a cap on the subassembly with the cap load and assembly station, verifying full assembly of the diagnostic medical test kit with the assembly verification work station, removing rejected diagnostic medical test kits from the pallet with the eject defective product work station, and removing

assembled diagnostic medical test kits from the pallet with the eject good product work station.

10. The method of claim 9, wherein the plurality of work stations further

5 include a visual inspection work station, and assembling the components of the diagnostic medical test kit at the plurality of work stations further include inspecting the cut test strip in the base with the visual inspection work station.

11. The method of claim 10, wherein the plurality of work stations further

10 include a photo-optic sensor to verify removal of the diagnostic medical test kits from the pallets to ensure that a pallets with diagnostic medical test kits are not transferred to the return line, and assembling the components of the diagnostic medical test kit at the plurality of work stations further include verifying with the photo-optic sensor that the diagnostic medical test kits are removed from the pallets prior to transferring the 15 diagnostic medical test kits to the return line.

12. An automatic diagnostic medical test kit assembly system, comprising:

an assembly line having a start end, a return end, a conveyor running in a direction;

20 a return line parallel to the assembly line and having a start end, a return end, and a conveyor running in a direction opposite of that of the conveyor of the assembly line;

a plurality of pallets carrying components of the medical test kit during assembly;

a plurality of work stations disposed along the assembly line to perform assembly steps on the components of the medical test kit;

5 a start end pallet transfer mechanism disposed at the start end of the assembly line and the return line to transfer the pallets from the return line to the assembly line;

5 and
a finish end pallet transfer mechanism disposed at the finish end of the assembly line and the return line to transfer the pallets from the assembly line to the return line.

13. The automatic diagnostic medical test kit assembly system of claim 12,

10 wherein one or more of the work stations along the assembly line are removably replaceable for performing a product changeover by replacing one or more of the work stations along the assembly line with one or more different work stations along the assembly line and the plurality of different pallets are replaceable for replacing the plurality of pallets with a plurality of different pallets for assembling a different product.

15 14. The automatic diagnostic medical test kit assembly system of claim 12,

wherein the automatic diagnostic medical test kit assembly system performs a one-up configuration, where one assembly operation occurs per machine cycle.

20 15. The automatic diagnostic medical test kit assembly system of claim 12,

wherein the automatic diagnostic medical test kit assembly system performs at least 3,600 cycles are performed per hour with at least one part produced per cycle.

16. The automatic diagnostic medical test kit assembly system of claim 12,
wherein the conveyor of the assembly line is an indexing conveyor that is servo-driven
and synchronous-intermittent.

5 17. The automatic diagnostic medical test kit assembly system of claim 12,
wherein the conveyor of the assembly line includes an upper surface with a plurality of
cleats, and the pallets include respective recesses that receive the cleats of the
conveyor.

10 18. The automatic diagnostic medical test kit assembly system of claim 12,
wherein the conveyor of the return line is a variable-speed linear return accumulating
conveyor.

15 19. The automatic diagnostic medical test kit assembly system of claim 12,
wherein the diagnostic medical test kit includes a base, a test strip, a wick, a cover, and
a cap, the plurality of work stations include a base loading station, a test strip insertion
station, a wick loading station, a cover load work station, a pneumatic press station, a
cap load and assembly station, an assembly verification work station, an eject defective
product work station, and an eject good product work station.

20 20. The automatic diagnostic medical test kit assembly system of claim 12,
wherein the plurality of work stations further include a visual inspection work station.

21. The automatic diagnostic medical test kit assembly system of claim 12,
wherein the plurality of work stations further include a photo-optic sensor to verify
removal of the diagnostic medical test kits from the pallets to ensure that a pallets with
diagnostic medical test kits are not transferred to the return line.